

## SECTION 11020 - VIBRATION AND CRITICAL SPEED LIMITATIONS

### City of San Diego, CWP Guidelines

#### PART 1--GENERAL

##### 1.1 WORK OF THIS SECTION

- A. This Section specifies vibration and critical speed limitations for rotating mechanical equipment. Factory and/or field testing and vibration measurements shall be taken when specified in the individual equipment specification sections.

##### 1.2 VIBRATION LIMITATIONS

- A. **General:** Vibration frequencies shall span the range from 5.0 to 5000 Hz. Where specified, measurements shall be obtained while the installed equipment is operating within the specified speed range.

B. **Centrifugal:**

1. **Machines with Sleeve Bearings:** Unless otherwise specified, centrifugal machines with sleeve bearing shafts shall not exhibit unfiltered RMS readings for vibration displacement in excess of the following:

Shaft speed range, rpm	Displacement, peak to peak, mils
Up to 900	3.5
901-1800	3.0
1801-3000	2.5
3001-4500	2.0
Above 4500	1.6

2. Displacement measurements shall be taken radially on the shaft at two points at each bearing, except for well pumps which shall be measured at top of motor. Measuring points shall be 90 degrees apart.
3. **Machines with Antifriction Bearings:** Unless otherwise specified, centrifugal machines with antifriction bearing shafts shall not exhibit unfiltered RMS readings for vibration velocity in excess of 0.12 inch per second. Velocity measurements shall be taken on one point of each bearing housing.

- C. **Positive Displacement Machines:** Unless otherwise specified, positive displacement machines of the rotary, reciprocating and controlled volume types shall operate without any lateral or torsional vibration characteristics that may accelerate wear of the equipment. The CONTRACTOR shall provide manufacturer's certification that the manufacturer has inspected

the machine under operating conditions and found it to comply with the requirements of this paragraph.

### 1.3 CRITICAL SPEED REQUIREMENTS

- A. Unless otherwise specified, rotating mechanical equipment shall not exhibit critical speeds within the specified range of operating speeds. Critical speeds for equipment with rigid rotor systems shall be at least 20 percent greater than maximum operating speed. Critical speeds for equipment with flexible shaft-rotor systems shall be at least 15 percent below minimum operating speed and 20 percent above maximum operating speed.

### 1.4 SHOP DRAWINGS AND SAMPLES

- A. The following information shall be submitted in accordance with Section 01300:
  - 1. Manufacturer's certified data showing location of critical speeds in relation to operating speeds.

## **PART 2--PRODUCTS (NOT USED)**

## **PART 3--EXECUTION (NOT USED)**

**\*\*END OF SECTION\*\***